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EXPRESS MAIL NO. EK673490947US

PATENT

Attornev's. Docket No. 00-8018

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
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Washington, D. C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of:

Inventors: Benjamin Bin LI

For: MOBILE CACHE FOR DYNAMICALLY COMPOSING USER-SPECIFIC INFORMATION

Certification Under 37 CFR 1.10

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Attorney's Docket No. 00-8018

Enclosed are:

[**9**] pages of specification and cover sheet
[**6**] pages of claims
[**1**] page of abstract
[1] sheet of formal drawings.
[**2**] pages of declaration and power of attorney.
[**2**] pages of assignment and assignment recordation form
[-] pages of information disclosure statement
[-] page of USPTO form 1449
[-] reference
[**1**] return postcard

CLAIMS AS FILED

	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE $710.00
TOTAL CLAIMS	17 - 20	0x	$18	000.00
INDEPENDENT CLAIMS	2-3x	0x	$80	000.00
MULTIPLE DEPENDENT CLAIM(S)		0 x	$260.00	
			TOTAL FILING FEE	$710.00

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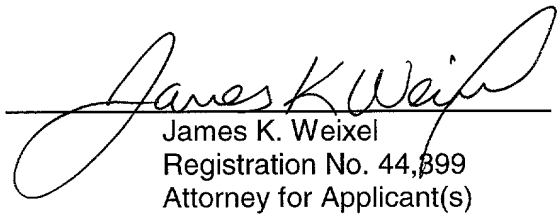
[x] The Commissioner is hereby authorized to charge any additional fees under 37 CFR 1.16 and 1.17 which may be required by the papers submitted herewith or credit any overpayment to Account No. 07-2339.



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PATENT
DOCKET NO. 00-8018

UNITED STATES PATENT APPLICATION

OF

Benjamin Bin LI

FOR

MOBILE CACHE FOR DYNAMICALLY COMPOSING USER-SPECIFIC INFORMATION

TECHNICAL FIELD

The present invention relates to caching, and more particularly to a cache that handles both static and dynamic data.

BACKGROUND OF THE INVENTION

Wireless Application Protocol ("WAP") enabled services are currently becoming more popular as more users incorporate wireless devices into their daily lives. As is known in the art, WAP is a standardized way for wireless devices (e.g. portable phones, hand-held devices) to communicate with each other and to access the Internet.

Caches are widely used in many applications to improve processing speed by providing a location for temporary data storage. For example, the cache can store recently accessed Web pages so that, when the user later returns to the Web page, the browser obtains the Web page information locally from the cache rather than from the origin server. The information from the cache reaches the user faster and also relieves the network from the burden of the additional traffic that would have occurred if the Web page information had to be re-transmitted to the wireless device.

Currently known-caching schemes in wireless applications, however, can deal only with static data and cannot generate any information according to user-specified parameters. As a result, there are no known ways of providing personalized information delivery with existing cache systems.

There is a need for a cache system that is not limited to handling static data and that can handle and generate dynamic user-specific information.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a mobile cache system and method for Wireless Application Protocol ("WAP") enabled services. The inventive mobile cache system not only can cache static data, but also can share processing functions with origin Web servers and facilitate dynamic creation of user-specific information.

A mobile cache server according to the invention obtains a user profile, which contains preference data with respect to output content and layout, looks for user-requested information in an object database, fetches and caches the information from an origin server if the information is not already in the object database, and

composes user-specific information according to the preference data.

As a result, the inventive system and method caches static data like known caches but also shares data processing functions with origin Web servers and allows dynamic creation of user-customized information. By dynamically generating information as well as caching static pages, the invention reduces traffic burden on the original server while providing users with personalized, user-specified information service.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a schematic diagram of a mobile cache system architecture incorporating one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 is a representative diagram of a mobile cache system architecture incorporating the mobile cache of the present invention. As indicated in the Figure, the mobile cache 100 is particularly suited to a system using Wireless Application Protocol ("WAP") enabled services and is designed to improve the experience of wireless device (e.g.

wireless phones, hand-held devices) users during Internet access. As can be seen in the Figure, a wireless device 102 couples to the mobile cache 100 via a mobile network 104 connected to a WAP proxy server 106. The WAP proxy server 106 is connected to the mobile cache 100 and directly to the Internet 108, which include Hypertext Markup Language ("HTML") servers 110, WAP servers 112, and/or neighbor caches 114. The term "origin server" will be used in this application to refer to any location from which the mobile cache 100 obtains its original data, such as the Internet 108.

The mobile cache 100 itself preferably includes an object repository or database 116 that caches selected data from the origin server, such as recently accessed Web pages. The mobile cache 100 also includes a user profile database 118 and a dynamic information composer 120. The user profile database 118 stores one or more user profiles that contain output preference data. The output preference data may include data specifying the content and layout of the information fetched from the object database 116 when it is delivered to the user via the wireless device 102. When the mobile cache 100 receives a user request for specific information from the Internet 108, it first looks

to the user profile database 118 to obtain the user profile associated with the user making the request. If the user's profile is not available in the database 118, the mobile cache 110 may either display the fetched information using standardized content and formatting or request additional information from the user to generate a new user profile to be stored in the user profile database 118.

Once the mobile cache 100 receives a user request and obtains the user profile from the user profile database 118, the mobile cache server looks for the requested information in the object database 116. If all of the requested information is located in the object database 116, the dynamic information composer 120 uses the requested information to compose user-specific information according to the user's preferences with respect to content and layout. The information is preferably composed in Wireless Markup Language ("WML") in real time. The user-specific information is then outputted to the wireless device 102 for the user's consideration.

If the object database does not contain all of the requested information and if the missing information is not available in local or neighbor caches, the mobile cache 100 will declare a cache miss and pass the user request to the

origin server so that the information can be fetched from the origin server (e.g., the Internet 108) and then stored in the object database 116. The dynamic information composer 120 then composes the user-specific information in the manner explained above, according to the user's preferences with respect to content and layout specified in the user profile. As the dynamic information composer 120 generates the user-specific information and caches static pages, the mobile cache 100 may locally maintain logs that can be appended to log files of origin servers.

As can be seen in Figure 1, the mobile cache 100 may also include a change-based trigger 122 that monitors information changes in the object database 116 and triggers information delivery, according to user preferences, when the amount of changed information reaches a predetermined threshold. This monitoring and triggering preferably occurs even while the dynamic information composer 120 is composing user-specific information.

The mobile cache 100 according to the present invention also may include an image converter 124 and/or a document converter 126. The image converter 124 can be used alone if the mobile cache 100 is constructed to function in its simplest mode. Caching image objects

improves performance by saving a great deal of network bandwidth. Because the small screens in wireless devices, such as phones and hand-held devices, have difficulty rendering the image objects that are often attached to HTML files, the image converter 124 converts the image objects so that they can be viewed by WAP-enabled devices before they are cached into the object database 116.

The document converter 126 can be included to create an advanced operating mode for the mobile cache 100 by being able to extract data segments from single or multiple Web pages to provide further dynamic information composition capability. The document converter 126 takes advantage of XML-based content tagging by converting the HTML files obtained from the origin server into Extensible Markup Language ("XML") files and storing them in the object database. The XML files, including their content-based tags, can then be queried by the mobile cache server based on the user's information request so that selected data segments from the XML files can be used to dynamically compose the user-specific information. By taking advantage of the XML-based content tags, the mobile cache 100 can customize the user-specific data at an additional level of detail. Of course, if the data from the origin server is

already a WML file, the WML file can be transmitted directly for storage in the object database 116 without first passing through the image converter 124 or the document converter 126.

Thus, the inventive mobile cache system is particularly suited for wireless application protocol (WAP) services and can be incorporated for use with WAP proxy or Web servers. Caching satisfies user information requests without having to access the origin server, reducing network bandwidth and reducing traffic load on origin servers. Further, by combining caching with dynamic information composition/transformation and providing the option of converting existing HTML applications for use on WAP-enabled services, the inventive mobile cache system can provide personalized WAP service and improved network and server performance at the same time.

It should be understood that various alternatives to the embodiments of the invention described herein may be employed in practicing the invention. It is intended that the following claims define the scope of the invention and that the method and apparatus within the scope of these claims and their equivalents be covered thereby.

CLAIMS

WHAT IS CLAIMED IS:

1. A system for caching data from an origin server, comprising:

a user profile database that stores at least one user profile containing output preference data with respect to at least one of output content and output layout;

an object database for storing selected data from the origin server; and

a dynamic information composer coupled to the object database and the user profile database, wherein the dynamic information composer composes user-specific information as an output based on data in the object database and the user profile.

2. The system of claim 1, further comprising a user profile generator coupled with the user profile database to generate a new user profile.

3. The system of claim 1, wherein the dynamic information composer composes the user-specific information in WML.

4. The system of claim 3, wherein the dynamic information composer composes the user-specific information in real time.

5. The system of claim 1, further comprising a change trigger coupled to the user profile database, the object database, and the dynamic information composer, wherein the change trigger monitors changes in the object database and triggers output delivery when a number of information changes in the object database reaches a predetermined threshold.

6. The system of claim 1, further comprising an image converter coupled to the object database for converting an image format of the selected data from the origin server, wherein the object database caches the selected data in the object database after image format conversion.

7. The system of claim 6, further comprising a document converter coupled to the object database for extracting data segments of the selected data from the origin server based on the output preference data, wherein

the dynamic information composer composes the user-specific information based on the data segments.

8. The system of claim 7, wherein the document converter converts an HTML file into an XML file and stores the XML file in the object database, and wherein the dynamic information composer composes the user-specific information based on an XML-based content tag in the XML file.

9. The system of claim 1, further comprising a document converter coupled to the object database for extracting data segments of the selected data from the origin server based on the output preference data.

10. The system of claim 9, wherein the document converter converts an HTML file into an XML file and stores the XML file in the object database, and wherein the dynamic information composer composes the user-specific information based on an XML-based content tag in the XML file.

11. A method for caching data from an origin server, comprising the steps of:

obtaining a user profile and an information request, wherein the user profile contains output preference data with respect to at least one of output content and output layout;

storing selected data from the origin server in an object database;

fetching requested information from the object database if the object database contains the requested information;

fetching and caching information from the origin server into the object database as the selected data if the object database does not contain the requested information; and

composing user-specific information based on the requested information from the fetching steps and the user profile information.

12. The method of claim 11, further comprising the step of delivering the user-specific information to a wireless device after the composing step.

13. The method of claim 12, further comprising the steps of:

monitoring a number of information changes in the object database; and

triggering the delivery step once the number of information changes in the object database reach a predetermined threshold.

14. The method of claim 11, further comprising the step of converting an image format of the selected data from the origin server, wherein the caching step occurs after the image format converting step.

15. The method of claim 14, further comprising the step of converting a document format of the selected data from the origin server, wherein the caching step occurs after the document format converting step.

16. The method of claim 15, wherein the document formatting step includes the steps of extracting at least one data segment of the selected data based on the output preference data such that the composing step composes the

user-specific information from said at least one data segment.

17. The method of claim 16, wherein the document formatting step includes the steps of:

converting an HTML file from the origin server to an XML file having an XML-based content tag;

storing the XML file in the object database,

and wherein the composing step composes the user-specific information based on the XML-content tag in the XML file.

ABSTRACT

A system and method for caching data in wireless application protocol (WAP) enabled services caches static data and facilitates dynamic creation of user-specific information to provide a customized output. The mobile cache generates the user-specific information in WML in real-time from cached information according to user-specified preferences. A change trigger triggers information delivery after a predetermined amount of cached information changes. The system may also include an image converter to ensure that image objects can be viewed easily on WAP-enabled devices having small display screens and a document converter to dynamically compose information from selected data based on XML-based content tagging.

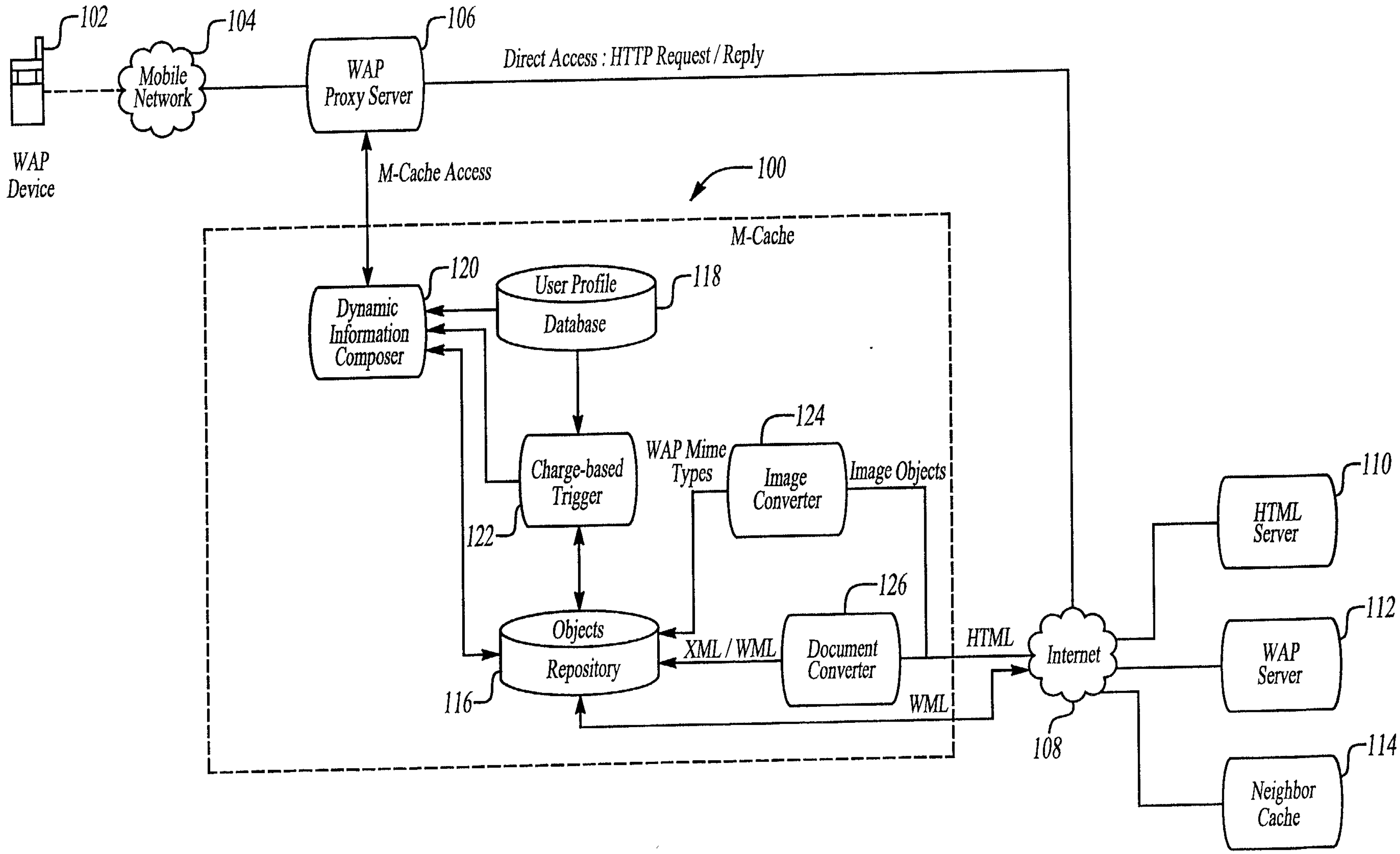
102
104
106
WAP Device
Mobile Network
WAP Proxy Server
Direct Access : HTTP Request / Reply
M-Cache Access
100
M-Cache
120
Dynamic Information Composer
User Profile Database
118
Charge-based Trigger
122
124
WAP Mime Types
Image Converter
Image Objects
126
Document Converter
Objects Repository
116
XML / WML
HTML
WML
Internet
108
HTML Server
110
WAP Server
112
Neighbor Cache
114

Fig-1

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

Docket No. **00-8018**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

MOBILE CACHE FOR DYNAMICALLY COMPOSING USER-SPECIFIC INFORMATION

the specification of which [X] is attached hereto. [ ] was filed on
as Appln. Serial No. And was amended on
I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed
(Number)	(Country)	(Day/Month/Year filed)	[_] Yes [_] No

I hereby claim the benefit under Title 35, United States Code, 119(e) of any United States provisional applications(s) listed below.

(Application Number) (Filing Date)

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date for this application:

(Appln. Serial No.) (Filing Date) (Status—patented, pending, abandoned)

EXPRESS MAIL NO. EK673490947US PATENT

Docket No.**00-8018**

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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Irving, TX 75038

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF INVENTOR **Benjamin Bin Li**

Inventor's signature _____ Date Oct. 5, 2000

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